SEQUENCE LISTING <110> Arnaut, Greta Boets, Anne Vanneste, St Van Rie, Jeroen Van Houdt, Sara <120> Novel Bacillus thuringiensis insecticidal proteins <130> 58764.000036 <140> US 10/040,906 <141> 2002-01-09 <160> PatentIn version 3.1 <170> <210> <211> 1899 DNA <212> <213> Bacillus thuringiensis <220> <221> CDS <222> (1)..(1896)<223> <400> 1 atg aat aat gta tta aat aac gga aga act act att tgt gat gcg tat 48 Met Asn Asn Val Leu Asn Asn Gly Arg Thr Thr Ile Cys Asp Ala Tyr 1 5 10 15 aat gta gtg gcc cat gat cca ttt agt ttt gag cat aaa tca tta gat 96 Asn Val Val Ala His Asp Pro Phe Ser Phe Glu His Lys Ser Leu Asp 20 25 30 acc atc cga aaa gaa tgg atg gag tgg aaa aga aca gat cat agt tta 144 Thr Ile Arg Lys Glu Trp Met Glu Trp Lys Arg Thr Asp His Ser Leu 35 40 tat gta gct cct ata gtc gga act gtt tct agc ttt ctg cta aag aag 192 Tyr Val Ala Pro Ile Val Gly Thr Val Ser Ser Phe Leu Leu Lys Lys 50 55 60 gtg ggg agt ctt att gga aaa agg ata ttg agt gaa tta tgg ggg tta 240 Val Gly Ser Leu Ile Gly Lys Arg Ile Leu Ser Glu Leu Trp Gly Leu 65 70 75 80 ata ttt cct agt ggt agc aca aat cta atg caa gat att tta agg gag 288 Ile Phe Pro Ser Gly Ser Thr Asn Leu Met Gln Asp Ile Leu Arg Glu 85 95 aca gaa caa ttc cta aat caa aga ctt aat aca gac act ctt gcc cgt 336 Thr Glu Gln Phe Leu Asn Gln Arg Leu Asn Thr Asp Thr Leu Ala Arg

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Phe Ala Gln Ala Asn Met His Leu Ser Phe Ile Arg Asp Val Val

180 185 190

Leu Asn Ala Asp Glu Trp Gly Ile Ser Ala Ala Thr Leu Arg Thr Tyr Gln Asn Tyr Leu Lys Asn Tyr Thr Thr Glu Tyr Ser Asn Tyr Cys Ile Asn Thr Tyr Gln Thr Ala Phe Arg Gly Leu Asn Thr Arg Leu His Asp 235 . Met Leu Glu Phe Arg Thr Tyr Met Phe Leu Asn Val Phe Glu Tyr Val Ser Ile Trp Ser Leu Phe Lys Tyr Gln Ser Leu Leu Val Ser Ser Gly Ala Asn Leu Tyr Ala Ser Gly Ser Gly Pro Gln Gln Thr Gln Ser Phe Thr Ser Gln Asp Trp Pro Phe Leu Tyr Ser Leu Phe Gln Val Asn Ser Asn Tyr Val Leu Asn Gly Phe Ser Gly Ala Arg Leu Thr Gln Thr Phe Pro Asn Ile Gly Gly Leu Pro Gly Thr Thr Thr His Ala Leu Leu Ala Ala Arg Val Asn Tyr Ser Gly Gly Val Ser Ser Gly Asp Ile Gly Ala Val Phe Asn Gln Asn Phe Ser Cys Ser Thr Phe Leu Pro Pro Leu Leu Thr Pro Phe Val Arg Ser Trp Leu Asp Ser Gly Ser Asp Arg Gly Gly Val Asn Thr Val Thr Asn Trp Gln Thr Glu Ser Phe Glu Ser Thr Leu Gly Leu Arg Cys Gly Ala Phe Thr Ala Arg Gly Asn Ser Asn Tyr 

Phe Pro Asp Tyr Phe Ile Arg Asn Ile Ser Gly Val Pro Leu Val Val

Arg Asn Glu Asp Leu Arg Arg Pro Leu His Tyr Asn Glu Ile Arg Asn 435 440 445

Ile Glu Ser Pro Ser Gly Thr Pro Gly Gly Leu Arg Ala Tyr Met Val 450 455 460

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Glu Lys Phe Gly Asn Gln Gly Asp Ser Leu Arg Phe Glu Gln Ser Asn 515 520 525

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Ile	e Phe	e Pro	o Ser	Gl <sub>3</sub> 85	y Sei	: Ile	e Glu	ı Sei	r Met 90	: Glr	n Ası	p Ile	e Lei	a Arg 95	g Gly	
gca Ala	a gaa a Glu	a caa ı Glr	a ttt 1 Phe 100	: Le	a aat ı Asr	caa n Glr	a aga	a ctt J Lei 105	ı Asp	gca Ala	a gad a Asp	c acc	ttt Phe	e Sei	cgt Arg	336
gta Val	a gaa l Glu	gca Ala 115	a Glu	tto Lei	g aga ı Arç	g Gly	ctt Leu 120	ı Glr	a gca n Ala	aat Asn	gta Val	a gag l Glu 125	ı Glu	tti Phe	aat Asn	384
cga Arg	caa g Glr 130	ı Val	g gac Asp	aat Asr	ttt Phe	tta Leu 135	Asn	cca Pro	a aat O Asn	caa Gln	aac Asr 140	1 Pro	gco Ala	cct Pro	tta Leu	432
gca Ala 145	гтте	att :Ile	gat Asp	tco Ser	gtt Val 150	Asn	aca Thr	ttg Leu	g caa i Gln	caa Gln 155	Leu	tto Phe	cta Leu	. agt . Ser	aga Arg 160	480
tta Leu	cca Pro	cag Gln	ttc Phe	cag Gln 165	ı Ile	caa Gln	cgc Arg	tat Tyr	cag Gln 170	Leu	tta Leu	tta Leu	tta Leu	cct Pro	tta Leu	528
ttt Phe	gca Ala	caa Gln	gca Ala 180	Ala	aat Asn	tta Leu	cac His	ctt Leu 185	Ser	ttt Phe	att Ile	aga Arg	gac Asp 190	Val	att Ile	576
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aga Arg	gag Glu 210	His	cta Leu	caa Gln	aga Arg	tat Tyr 215	aca Thr	cgc Arg	gaa Glu	tac Tyr	tcc Ser 220	Asn	tat Tyr	tgt Cys	ata Ile	672
aat Asn 225	acg Thr	tat Tyr	caa Gln	act Thr	gcg Ala 230	ttt Phe	aga Arg	Gly 999	tta Leu	aat Asn 235	gcc Ala	act Thr	tta Leu	cac His	gat Asp 240	720
ttt Phe	cta Leu	gaà Glu	ttt Phe	aga Arg 245	aca Thr	tat Tyr	atg Met	ttt Phe	tta Leu 250	aat Asn	gta Val	tta Leu	gac Asp	tat Tyr 255	gta Val	768
tct Ser	atc Ile	tgg Trp	tcg Ser 260	ttg Leu	ttt Phe	aaa Lys	tat Tyr	cag Gln 265	agc Ser	ctt Leu	ctg Leu	gta Val	tcc Ser 270	tct Ser	ggc Gly	816
gct Ala	aat Asn	tta Leu 275	tat Tyr	gcg Ala	agt Ser	ggt Gly	agt Ser 280	gga Gly	gta Val	aca Thr	aat Asn	aga Arg 285	caa Gln	tca Ser	ttt Phe	864
act Thr	gca Ala 290	caa Gln	gac Asp	tgg Trp	cca Pro	ttt Phe 295	tta Leu	aat Asn	tct Ser	ctt Leu	ttc Phe 300	caa Gln	gtt Val	aat Asn	caa Gln	912
aat Asn 305	tat Tyr	gta Val	tta Leu	aca Thr	ggt Gly 310	atg Met	aat Asn	ggt Gly	tat Tyr	agg Arg 315	tat Tyr	act Thr	tta Leu	agt Ser	tct Ser 320	960
gtt Val	ttt Phe	ggt Gly	aca Thr	aat Asn	caa Gln	aca Thr	ata Ile	cat His	tct Ser	gtt Val	agg Arg	agt Ser	aat Asn	tat Tyr	agg Arg	1008

				32!	5				330	)				33	5	
Gl <sup>7</sup> gg	ggg Gl	g gtt 7 Val	t tca l Sei 340	r Sei	c ggt	tad Y Tyr	att Ile	gga Gl <sub>3</sub> 345	/ Val	aat L Asi	t ct	t agt u Sei	gaa Glu 350	ı Gly	gac Y Asp	1056
caa Glr	a aat n Asr	ttt Phe 355	e Sei	tgt Cys	agt Ser	aca Thr	ttt Phe	e Let	g gat 1 Asp	cct Pro	tt: Lei	a gaa u Glu 365	ı Thı	a cco	g ttt D Phe	1104
att Ile	aga Arg 370	, Ser	tgg Trp	g cto Lei	g gat 1 Asp	tca Ser 375	. Gly	ago Ser	gat Asp	gat Asp	999 Gly 380	y Phe	aat Asr	tgg Trp	g agt Ser	1152
aca Thr 385	GIA	gto Val	ttt Phe	aca Thr	aca Thr 390	Thr	att Ile	ggt Gly	tta Leu	cct Pro 395	Thi	tgt Cys	agc Ser	att	ttt Phe 400	1200
tgg Trp	cct Pro	cgt Arg	ggt Gly	aac Asn 405	Ser	aac Asn	tat Tyr	ttt Phe	cca Pro 410	Asp	tat Tyr	ttt Phe	ata Ile	cga Arg 415	Asn	1248
att Ile	tct Ser	ggt Gly	gtc Val 420	Val	ggt Gly	cgt Arg	ctt Leu	agg Arg 425	Asn	gaa Glu	gat Asp	tta Leu	aga Arg 430	Arg	cca Pro	1296
cta Leu	tat Tyr	ttt Phe 435	Asn	gag Glu	ata Ile	aga Arg	aat Asn 440	Ile	gta Val	gga Gly	aat Asn	aac Asn 445	Asn	cca Pro	ccg Pro	1344
АІа	1nr 450	GIY	Ser	Leu	Ser	Val 455	Ala	Ser	Leu	Val	Ser 460		His	Asn	Arg	1392
ьуs 465	Asn	Asn	TTE	Tyr	Ala 470	Ala	His	Glu	Asn	Gly 475	Thr	atg Met	Ile	His	Leu 480	1440
gca Ala	ccg Pro	gaa Glu	gat Asp	tat Tyr 485	aca Thr	ggt Gly	ttc Phe	aca Thr	atg Met 490	tca Ser	cca Pro	ata Ile	cat His	gca Ala 495	act Thr	1488
caa Gln	gta Val	aat Asn	aat Asn 500	caa Gln	aca Thr	cga Arg	aca Thr	ttt Phe 505	att Ile	tcc Ser	gag Glu	aaa Lys	tta Leu 510	gga Gly	aac Asn	1536
caa Gln	ggt Gly	gat Asp 515	tcc Ser	ttg Leu	aga Arg	ttt Phe	gaa Glu 520	caa Gln	aca Thr	aat Asn	aca Thr	acg Thr 525	gct Ala	cga Arg	tac Tyr	1584
aca Thr	ttt Phe 530	aga Arg	ggg Gly	aat Asn	gga Gly	aat Asn 535	agt Ser	tac Tyr	aat Asn	ctt Leu	tat Tyr 540	tta Leu	aga Arg	gta Val	tct Ser	1632
tca Ser 545	cta Leu	gga Gly	aat Asn	tcc Ser	aca Thr 550	att Ile	cga Arg	gtt Val	Thr	ata Ile 555	aac Asn	ggt Gly	aga Arg	gtt Val	tat Tyr 560	1680
act Thr	gtt Val	tca Ser	Asn	gtc Val 565	aat Asn	act Thr	act Thr	Thr	aat Asn 570	aac Asn	gat Asp	gga Gly	Val	gtt Val 575	gat Asp	1728

aat Asn	ggc Gly	gct Ala	cgt Arg 580	Phe	tca Ser	gat Asp	att Ile	aat Asn 585	Ile	ggt Gly	aat Asn	gta Val	gtg Val 590	Ala	agt Ser	1776
gct Ala	aat Asn	act Thr 595	Asn	ata Ile	cca Pro	tta Leu	gat Asp 600	Ile	aat Asn	gta Val	aca Thr	ttt Phe 605	Asn	tct Ser	ggt	1824
acg Thr	caa Gln 610	Phe	gag Glu	ctt Leu	atg Met	aat Asn 615	att Ile	atg Met	ttt Phe	gtt Val	cca Pro 620	Thr	aat Asn	att Ile	cca Pro	1872
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Thr	Ile	Gln 35	Lys	Glu	Trp	Met	Glu 40	Trp	Lys	Arg	Thr	Asp 45	His	Ser	Leu	
Tyr	Val 50	Ser	Pro	Ile	Val	Gly 55	Thr	Ile	Ala	Ser	Phe 60	Leu	Leu	Lys	Lys	
Ile 65	Gly	Gly	Leu	Ile	Gly 70	Lys	Arg	Ile	Leu	Ser 75	Glu	Leu	Lys	Asn	Leu 80	
Ile	Phe	Pro	Ser	Gly 85	Ser	Ile	Glu	Ser	Met 90	Gln	Asp	Ile	Leu	Arg 95	Gly	
Ala	Glu	Gln	Phe 100	Leu	Asn	Gln	Arg	Leu 105	Asp	Ala	Asp	Thr	Phe 110	Ser	Arg	
Val	Glu	Ala 115	Glu	Leu	Arg	Gly	Leu 120	Gln	Ala	Asn	Val	Glu 125	Glu	Phe	Asn	
Arg	Gln 130	Val	Asp	Asn	Phe	Leu 135	Asn	Pro	Asn	Gln	Asn 140	Pro	Ala	Pro	Leu	

Ala 145		Ile	Asp	Ser	Val 150		Thr	Leu	Gln	Gln 155	Leu	Phe	Leu	Ser	Arg 160
Leu	Pro	Gln	Phe	Gln 165	Ile	Gln	Arg	Tyr	Gln 170	Leu	Leu	Leu	Leu	Pro 175	Leu
Phe	Ala	Gln	Ala 180	Ala	Asn	Leu	His	Leu 185	Ser	Phe	Ile	Arg	Asp 190	Val	Ile
Leu	Asn	Ala 195	Asp	Glu	Trp	Gly	Ile 200	Pro	Ala	Ala	Thr	Val 205	Arg	Thr	Tyr
Arg	Glu 210	His	Leu	Gln	Arg	Tyr 215	Thr	Arg	Glu	Tyr	Ser 220	Asn	Tyr	Cys	Ile
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Phe	Leu	Glu	Phe	Arg 245	Thr	Tyr	Met	Phe	Leu 250	Asn	Val	Leu	Asp	Tyr 255	Val
Ser	Ile	Trp	Ser 260	Leu	Phe	Lys	Tyr	Gln 265	Ser	Leu	Leu	Val	Ser 270	Ser	Gly
Ala	Asn	Leu 275	Tyr	Ala	Ser	Gly	Ser 280	Gly	Val	Thr	Asn	Arg 285	Gln	Ser	Phe
Thr	Ala 290	Gln	Asp	Trp	Pro	Phe 295	Leu	Asn	Ser	Leu	Phe 300	Gln	Val	Asn	Gln
Asn 305	Tyr	Val	Leu	Thr	Gly 310	Met	Asn	Gly	Tyr	Arg 315	Tyr	Thr	Leu	Ser	Ser 320
Val	Phe	Gly	Thr	Asn 325	Gln	Thr	Ile	His	Ser 330	Val	Arg	Ser	Asn	Tyr 335	Arg
Gly	Gly	Val	Ser 340	Ser	Gly	Tyr	Ile	Gly 345	Val	Asn	Leu	Ser	Glu 350	Gly	Asp
Gln	Asn	Phe 355	Ser	Cys	Ser	Thr	Phe 360	Leu	Asp	Pro	Leu	Glu 365	Thr	Pro	Phe
Ile	Arg 370	Ser	Trp	Leu	Asp	Ser 375	Gly	Ser	Asp	Asp	Gly 380	Phe	Asn	Trp	Ser
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385	390	395	400
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Trp Pro Arg Gly Asn Ser Asn Tyr Phe Pro Asp Tyr Phe Ile Arg Asn 405 410 415

Ile Ser Gly Val Val Gly Arg Leu Arg Asn Glu Asp Leu Arg Arg Pro 420 425 430

Leu Tyr Phe Asn Glu Ile Arg Asn Ile Val Gly Asn Asn Asn Pro Pro 435 440 445

Ala Thr Gly Ser Leu Ser Val Ala Ser Leu Val Ser Val His Asn Arg 450 455 460

Lys Asn Asn Ile Tyr Ala Ala His Glu Asn Gly Thr Met Ile His Leu 465 470 475 480

Ala Pro Glu Asp Tyr Thr Gly Phe Thr Met Ser Pro Ile His Ala Thr 485 490 495

Gln Val Asn Asn Gln Thr Arg Thr Phe Ile Ser Glu Lys Leu Gly Asn 500 505 510

Gln Gly Asp Ser Leu Arg Phe Glu Gln Thr Asn Thr Thr Ala Arg Tyr 515 520 525

Thr Phe Arg Gly Asn Gly Asn Ser Tyr Asn Leu Tyr Leu Arg Val Ser 530 540

Ser Leu Gly Asn Ser Thr Ile Arg Val Thr Ile Asn Gly Arg Val Tyr 545 550 560

\$

Thr Val Ser Asn Val Asn Thr Thr Thr Asn Asn Asp Gly Val Val Asp 565 570 575

Asn Gly Ala Arg Phe Ser Asp Ile Asn Ile Gly Asn Val Val Ala Ser 580 585 590

Ala Asn Thr Asn Ile Pro Leu Asp Ile Asn Val Thr Phe Asn Ser Gly 595 600 605

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Pro Ile Tyr 625

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gca tac aac gtt gtt gct cat gat cct ttc tct ttc gag cat aag Ala Tyr Asn Val Val Ala His Asp Pro Phe Ser Phe Glu His Lys 20 25 30	tct 95 Ser
ctt gat aca att agg aag gag tgg atg gag tgg aag agg act gat Leu Asp Thr Ile Arg Lys Glu Trp Met Glu Trp Lys Arg Thr Asp 35 40 45	cat 143 His
tct ctt tac gtt gct cct att gtt ggt act gtt tct tct ttc ctt Ser Leu Tyr Val Ala Pro Ile Val Gly Thr Val Ser Ser Phe Leu 50 55 60	ctt 191 Leu
aag aag gtt ggt tct ctt atc ggt aag agg atc ctt tct gag ctt Lys Lys Val Gly Ser Leu Ile Gly Lys Arg Ile Leu Ser Glu Leu 65 70 75	tgg 239 Trp
ggt ctt atc ttc cct tct ggt tct act aac ctt atg caa gat att Gly Leu Ile Phe Pro Ser Gly Ser Thr Asn Leu Met Gln Asp Ile 80 85 90	ctt 287 Leu 95
agg gag act gaa caa ttc ctt aac cag agg ctt aac act gat act Arg Glu Thr Glu Gln Phe Leu Asn Gln Arg Leu Asn Thr Asp Thr 100 105 110	ctt 335 Leu
gct agg gtt aac gct gag ctt gag ggt ctt caa gct aac att agg Ala Arg Val Asn Ala Glu Leu Glu Gly Leu Gln Ala Asn Ile Arg 115 120 125	gaa 383 Glu
ttc aac cag caa gtt gat aac ttc ctt aac cct act caa aac cct Phe Asn Gln Gln Val Asp Asn Phe Leu Asn Pro Thr Gln Asn Pro 130 135 140	
cct ctt tct att act tct tct gtt aac act atg caa caa ctt ttc Pro Leu Ser Ile Thr Ser Ser Val Asn Thr Met Gln Gln Leu Phe 145 150 155	ctt 479 Leu
aac agg ctt cct caa ttc agg gtt caa ggt tac caa ctt ctt ctt Asn Arg Leu Pro Gln Phe Arg Val Gln Gly Tyr Gln Leu Leu 160 165 170	ctt 527 Leu 175

				_		gct Ala	_		_			_					575
_		_			_	gat Asp						_	_				623
						ctt Leu	_										671
	_					caa Gln		_									719
F						ttc Phe 245											767
		_				tct Ser			_		_				_	tct Ser	815
						tac Tyr	_										863
						gac Asp										_	911
					_	ctt Leu						_					959
7						ggt Gly 325										_	1007
			_	_		gtt Val						_				_	1055
		~ ~	_	_		aac Asn	-				_						1103
						ttc Phe	_					_				_	1151
				_		act Thr	_										1199
5				-		agg Arg 405	-		_								1247
ć	aac	tac	ttc	cct	gat	tac	ttc	att	agg	aac	att	tct	ggt	gtt	cct	ctt	1295

Asn	ту	r Ph	e Pro	420	р Туг )	r Phe	e Ile	e Arg	3 Ası 425		e Sei	r Gly	/ Va]	Pro 430	Leu	
gtt Val	gtt Val	agg L Arg	g aac g Asn 435	Gli	g gat ı Asp	ctt Leu	agg Arg	g agg g Arg 440	g Pro	ctt Leu	cat His	tac Tyr	aac Asr 445	Glu	g att i Ile	1343
agg Arg	aac Asr	att 1 Ile 450	e GIu	tct Ser	cct Pro	tct Ser	ggt Gly 455	Thr	cct Pro	ggt Gly	ggt Gly	ctt Leu 460	Arg	gct Ala	tac Tyr	1391
atg Met	gtt Val 465	. ser	gtt Val	cat His	aac Asn	agg Arg 470	Lys	aac Asn	aac Asn	atc Ile	tac Tyr 475	Ala	gtt Val	cat His	gag Glu	1439
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atc Ile	tcc Ser	gag Glu	aag Lys 515	ttc Phe	ggc	aac Asn	cag Gln	ggc Gly 520	gac Asp	tcc Ser	ctg Leu	agg Arg	ttc Phe 525	gag Glu	cag Gln	1583
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acc Thr 560	atc Ile	aac Asn	ggc Gly	agg Arg	gtg Val 565	tac Tyr	acc Thr	gcc Ala	tcc Ser	aac Asn 570	gtg Val	aac Asn	acc Thr	acc Thr	acc Thr 575	1727
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atg Met	ggc Gly	aac Asn	gtc Val 595	gtg Val	gcc Ala	tcc Ser	gac Asp	aac Asn 600	acc Thr	aac Asn	gtg Val	ccc Pro	ctg Leu 605	gac Asp	atc Ile	1823
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<213> Unknown

<220>

<223> Artificial Sequence

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Asp Thr Ile Arg Lys Glu Trp Met Glu Trp Lys Arg Thr Asp His Ser 35 40 45

Leu Tyr Val Ala Pro Ile Val Gly Thr Val Ser Ser Phe Leu Lys 50 55 60

Lys Val Gly Ser Leu Ile Gly Lys Arg Ile Leu Ser Glu Leu Trp Gly 70 75 80

Leu Ile Phe Pro Ser Gly Ser Thr Asn Leu Met Gln Asp Ile Leu Arg 85 90 95

Glu Thr Glu Gln Phe Leu Asn Gln Arg Leu Asn Thr Asp Thr Leu Ala 100 105 110

Arg Val Asn Ala Glu Leu Glu Gly Leu Gln Ala Asn Ile Arg Glu Phe 115 120 125

Asn Gln Gln Val Asp Asn Phe Leu Asn Pro Thr Gln Asn Pro Val Pro
130 135 140

Leu Ser Ile Thr Ser Ser Val Asn Thr Met Gln Gln Leu Phe Leu Asn 145 150 155

Arg Leu Pro Gln Phe Arg Val Gln Gly Tyr Gln Leu Leu Leu Pro 165 170 175

Leu Phe Ala Gln Ala Ala Asn Met His Leu Ser Phe Ile Arg Asp Val 180 185 190

Val Leu Asn Ala Asp Glu Trp Gly Ile Ser Ala Ala Thr Leu Arg Thr 195 200 205

Tyr Gln Asn Tyr Leu Lys Asn Tyr Thr Thr Glu Tyr Ser Asn Tyr Cys 210 215 220

Ile Asn Thr Tyr Gln Thr Ala Phe Arg Gly Leu Asn Thr Arg Leu His Asp Met Leu Glu Phe Arg Thr Tyr Met Phe Leu Asn Val Phe Glu Tyr Val Ser Ile Trp Ser Leu Phe Lys Tyr Gln Ser Leu Leu Val Ser Ser Gly Ala Asn Leu Tyr Ala Ser Gly Ser Gly Pro Gln Gln Thr Gln Ser Phe Thr Ser Gln Asp Trp Pro Phe Leu Tyr Ser Leu Phe Gln Val Asn Ser Asn Tyr Val Leu Asn Gly Phe Ser Gly Ala Arg Leu Thr Gln Thr Phe Pro Asn Ile Gly Gly Leu Pro Gly Thr Thr Thr His Ala Leu Leu Ala Arg Val Asn Tyr Ser Gly Gly Val Ser Ser Gly Asp Ile Gly Ala Val Phe Asn Gln Asn Phe Ser Cys Ser Thr Phe Leu Pro Pro Leu Leu Thr Pro Phe Val Arg Ser Trp Leu Asp Ser Gly Ser Asp Arg Gly Gly Val Asn Thr Val Thr Asn Trp Gln Thr Glu Ser Phe Glu Ser Thr Leu Gly Leu Arg Cys Gly Ala Phe Thr Ala Arg Gly Asn Ser Asn Tyr Phe Pro Asp Tyr Phe Ile Arg Asn Ile Ser Gly Val Pro Leu Val Val Arg Asn Glu Asp Leu Arg Arg Pro Leu His Tyr Asn Glu Ile Arg Asn Ile Glu Ser Pro Ser Gly Thr Pro Gly Gly Leu Arg Ala Tyr Met Val Ser Val His Asn Arg Lys Asn Asn Ile Tyr Ala Val His Glu Asn

465	470	475	480					
Gly Thr Met Ile His 485	Leu Ala Pro Glu Asp 490	Tyr Thr Gly Phe Thr 495						
Ser Pro Ile His Ala 500	Thr Gln Val Asn Asn 505	Gln Thr Arg Thr Phe 510	Ile					
Ser Glu Lys Phe Gly 515	Asn Gln Gly Asp Ser 520	Leu Arg Phe Glu Gln 525	Ser					
Asn Thr Thr Ala Arg 530	Tyr Thr Leu Arg Gly 535	Asn Gly Asn Ser Tyr 540	Asn					
	Ser Ser Leu Gly Asn 550	Ser Thr Ile Arg Val 555	Thr 560					
Ile Asn Gly Arg Val 565	Tyr Thr Ala Ser Asn 570	Val Asn Thr Thr 575	Asn					
Asn Asp Gly Val Asn 580	Asp Asn Gly Ala Arg 585	Phe Leu Asp Ile Asn 590	Met					
Gly Asn Val Val Ala 595	Ser Asp Asn Thr Asn 600	Val Pro Leu Asp Ile 605	Asn					
Val Thr Phe Asn Ser	Gly Thr Gln Phe Glu 615	Leu Met Asn Ile Met 620	Phe					
Val Pro Thr Asn Leu :	Pro Pro Ile Tyr 630							
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tggagtggaa gcgcaccgad	c cacageetgt aegtgge	ccc tatcgtgggc accgt	gagca 180					
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